

# PRECIPITATION TYPES

## And Determining Factors



GySgt Stubbs

# Overview

- Definition
- Reported types of precipitation
- Precipitation qualifiers
- Determining factors

## Reference

NAVMETOC COMINST 3141.2  
Surface METAR Observations

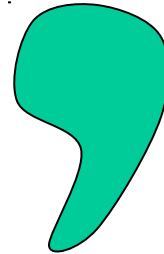
# Precipitation Defined

- Any of the forms of water particles, whether liquid or solid, that fall from the atmosphere and reach the ground



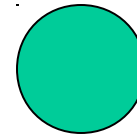
# Reported Types of Precip.

- Drizzle (DZ)
- Fairly uniform precipitation composed exclusively of fine drops (diameter less than 0.02 inches) very close together



# Reported Types of Precip

- Rain (RA)
- Precipitation of liquid water particles, either in the form of drops larger than 0.02 inches, or smaller drops which, in contrast to drizzle, are widely separated



**DRIZZLE:** Drops with diameter smaller than .02 inch falling close together.

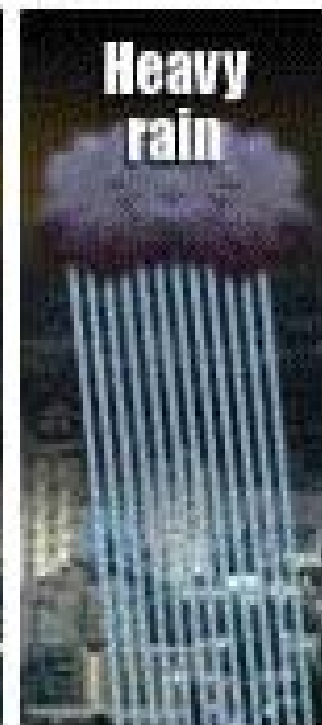
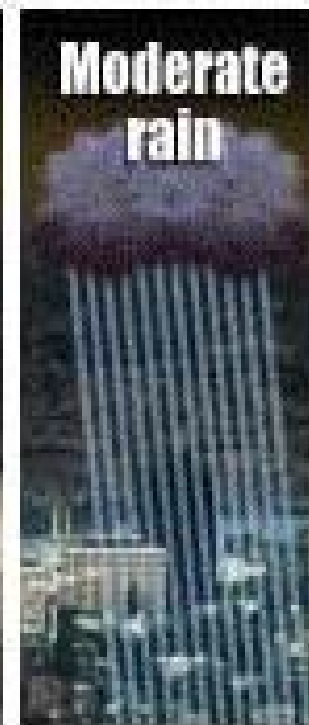
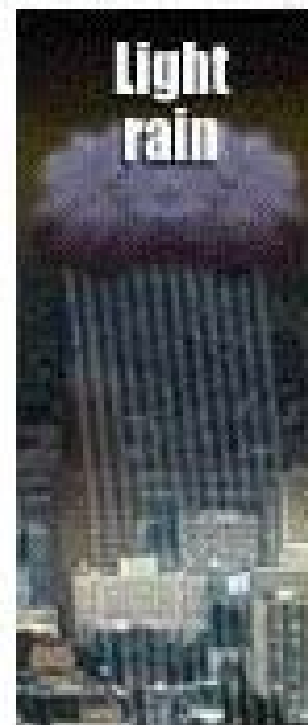


*Visibility  
more than  
1/2 mile.*

*Visibility  
from 1/2  
to 1/4 mile.*

*Visibility  
less than  
1/4 mile.*

**RAIN:** Drops with diameter larger than .02 inch or smaller drops, widely separated.




*0.1 inch  
or less in  
an hour*

*.11 to .30  
inches  
per hour*

*More than  
.30 inches  
per hour.*

# Reported Types of Precip.

- Snow (SN) 
- Precipitation of snow crystals, mostly branched in the form of six-pointed stars. At temperatures higher than approximately -5 Celsius (23 degrees F) the crystals are generally clustered to form snowflakes



# Reported Types of Precip.

- Snow Grains (SG)
- Precipitation of very small, white, opaque grains of ice. When the grains hit hard ground, they DO NOT bounce or shatter. They usually fall in small quantities, mostly from Stratus type clouds, NEVER as showers





# Reported Types of Precip.

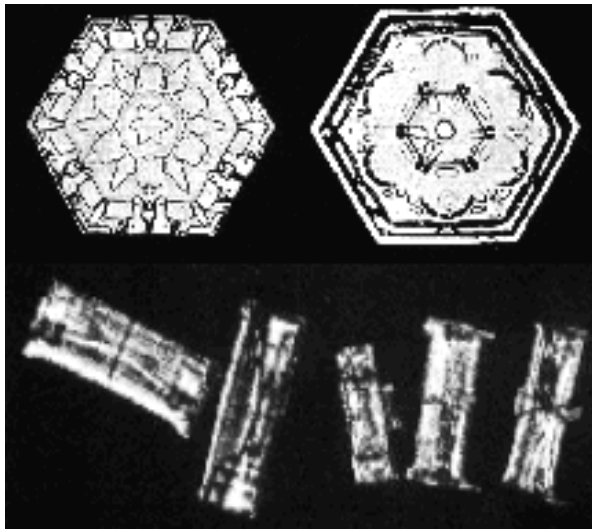
- Ice Crystals (IC)



- A fall of unbranched ice crystals in the form of needles, columns, or plates. These are often so tiny that they seem suspended in the air. They may fall from a cloud or from clear air. The crystals are visible mainly when they glitter in sunshine or other bright light (diamond dust); they may then produce a luminous pillar or other optical phenomenon. This hydrometer, which is frequent in polar regions, occurs only at very low temperatures in stable air masses.



Ice Needles



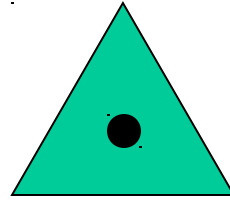
Ice Plates & Columns



Example of an optical effect  
caused by Ice Crystals

# Reported Precip. Types

- Ice Pellets (PE)

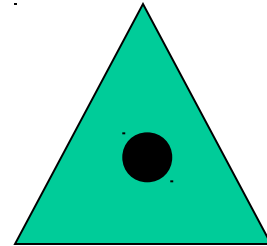


- Precipitation of transparent or translucent pellets of ice, which are round or irregular, rarely conical, and which have a diameter of 0.2 inches or less. The pellets usually rebound when striking hard ground, and make a sound on impact. There are 2 main types:

# Ice Pellets

## Type 1

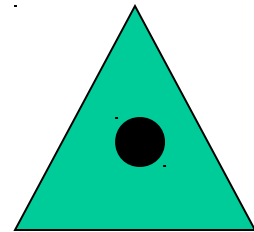
- Hard grains of ice consisting of frozen raindrops, or largely melted and re-frozen snowflakes. This type falls as continuous or intermittent precipitation


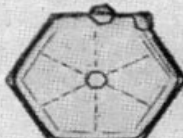










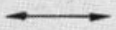











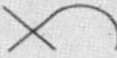

















# Ice Pellets

## Type 2

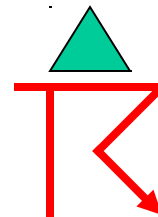
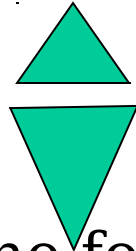
- Pellets of Snow encased in a thin layer of ice which have formed from the freezing, either of droplets intercepted by the pellets, or of water resulting from the partial melting of the pellets. This form falls as showers.



CODE	GRAPHIC SYMBOL	TYPICAL FORMS			TERM
1					Plates
2					Stellar crystals
3					Columns
4					Needles
5					Spatial dendrites
6					Capped columns
7					Irregular particles
8					Graupel (soft hail)
9					Ice pellets (Am. sleet)
0					Hail

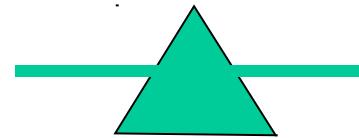
# Reported Precip. Types

- Hail (GR)
- Precipitation in the form of small balls or other pieces of ice (hailstones) falling separately or frozen together in irregular lumps. Hailstones consist of alternate opaque and clear layers in most cases



# Reported Precip. Types

- Small Hail or Snow Pellets (GS)
- Precipitation of white opaque grains of ice. The grains are round or sometimes conical. Diameters range from 0.08 to 0.2 inches. Snow pellets are brittle and easily crushed; when they fall on hard ground, they bounce and often break up.





# Precipitation Qualifiers

- Present weather qualifiers fall in two main categories
- 1) **intensity** or **proximity**
- 2) **descriptors**



# Precipitation Qualifiers

## **Intensity**

- Defined as **light** (-), **moderate** (no entry), or **heavy** (+)
- Intensities ***SHALL NOT*** be assigned to Hail (GR) or Ice Crystals (IC)
- When intensity is assigned to the precip. “group” it denotes the intensity of the predominate type of precipitation

# Precipitation Qualifiers

## Proximity

- **On Station** (no entry) indicates the phenomenon is occurring within 5 statute miles of the observation location
- **Vicinity** (VC) indicates the phenomenon is occurring between 5 and 10 miles from the station
- **Distant** (DSNT) (remarks) indicates that the phenomenon is occurring at a distance greater than 10 miles from the station

# Precipitation Qualifiers

## **Descriptors**

- Descriptors are qualifiers which further amplify weather phenomenon and are only used with certain types of precipitation



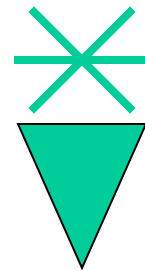
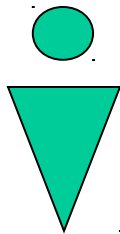


# Descriptors

- **Low Drifting** (DR) - used to further describe the condition of - for example - snow which is raised by the wind to a height of less than 6 feet and does not reduce prevailing visibility (i.e.. DRSN)
- **Blowing** (BL) - used to further describe the condition of - again, for example - snow which is raised by the wind to a height equal to or greater than 6 feet, and **DOES** reduce prevailing visibility

# Descriptors

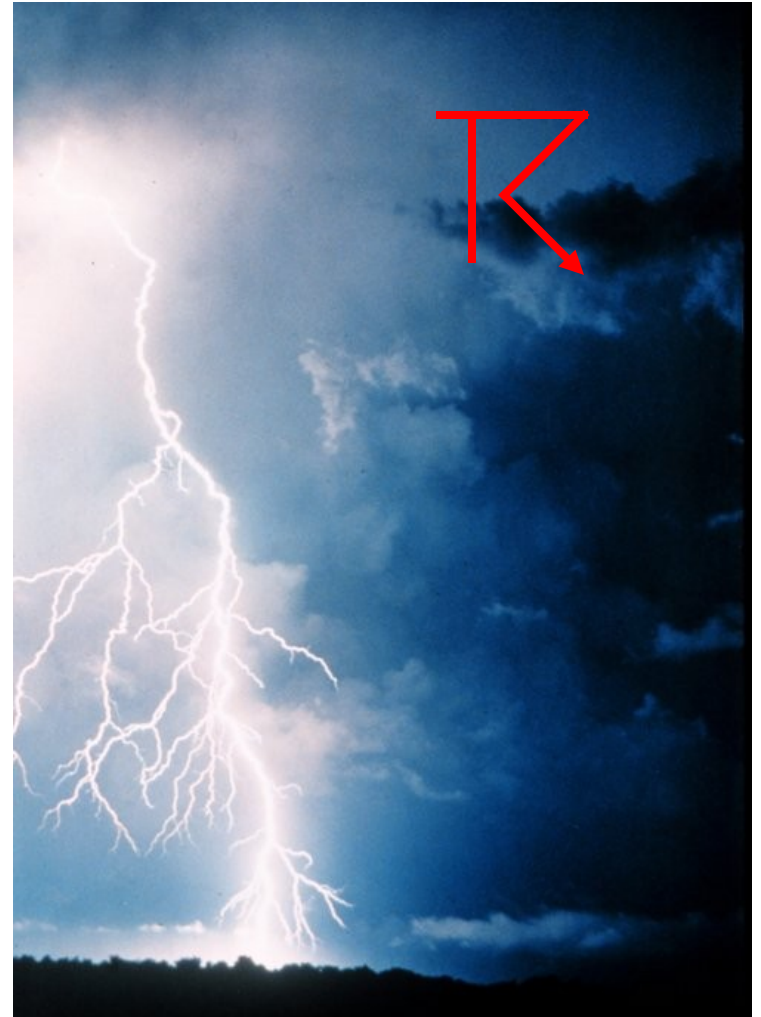
- Showers (SH) - used to describe precipitation as characterized by the suddenness with which they start and stop, by the rapid changes in intensity, and usually by rapid changes in the appearance of the sky





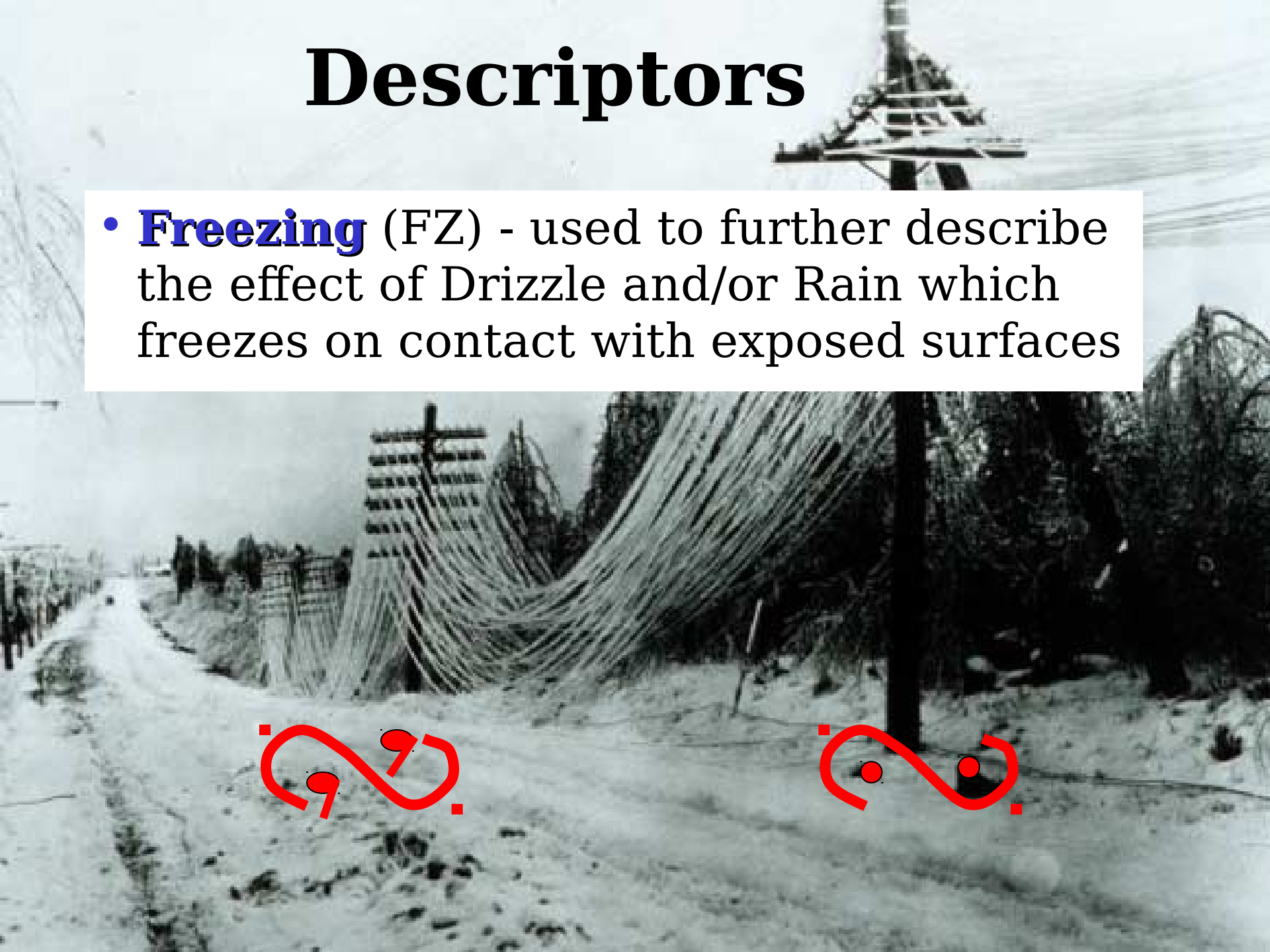
# Descriptors

- **Thunderstorm** (TS) -  
A local storm produced by Cumulonimbus cloud types that is accompanied by lightning and/or thunder, usually with heavy rain, gusty winds, and sometimes hail and funnel clouds



# Descriptors

- **Freezing** (FZ) - used to further describe the effect of Drizzle and/or Rain which freezes on contact with exposed surfaces





## 1. Temperature Decreases Monotonically with Height

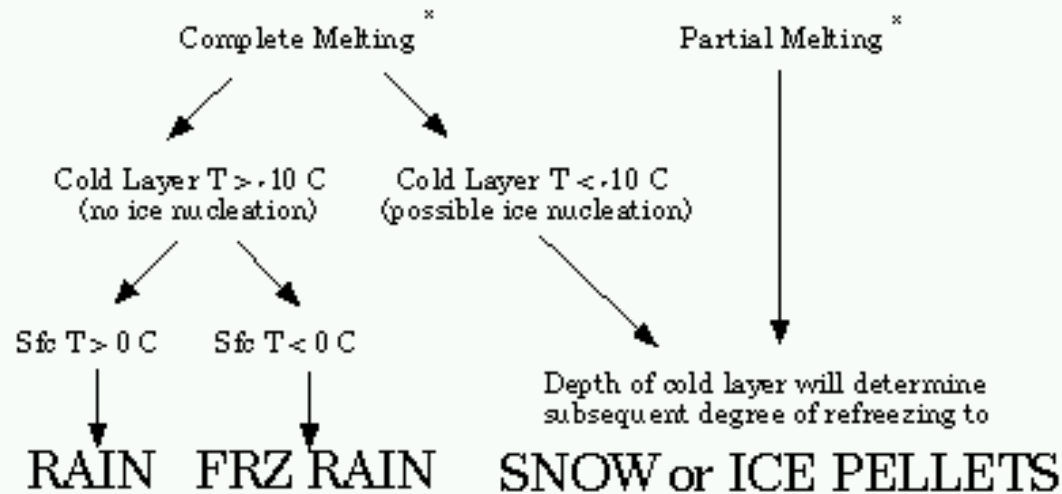
Wet Bulb Temperature  $< 0^{\circ}\text{C}$   
everywhere

Wet Bulb Temperature  $> 0^{\circ}\text{C}$   
anywhere

# Determining Factors

Freezing Level	Chance that Precipitation Will be Snow:
35 mb or 950 ft	50 %
25 mb or 660 ft	70 %
12 mb or 315 ft	90 %

## 2. Elevated Warm Layer



\* The degree of melting is determined by the Cyrys et al. (1996) or Stewart and King (1988) relationships based on warm layer temperature and warm layer depth.

# It all starts with snow

Cold air

**Rain**

Warm air

**1**

Snow falls into warm air, melts into rain

Cold air



# It all starts with snow

Cold air

## Freezing Rain

Warm air

Cold air

2

Snow melts, hits cold air, freezes when it hits something



# It all starts with snow

Cold air

**Sleet**

**3**

Snow melts,  
refreezes into  
sleet as it  
travels through  
cold air

Warm air

Cold air



# It all starts with snow

Cold air

**Snow**

**4** Falling into cold air, it never melts on way down

Cold air



**RAIN**

**FREEZING RAIN**

**COLD  
AIR**

**SLEET**

**SNOW**

**WARM  
AIR**

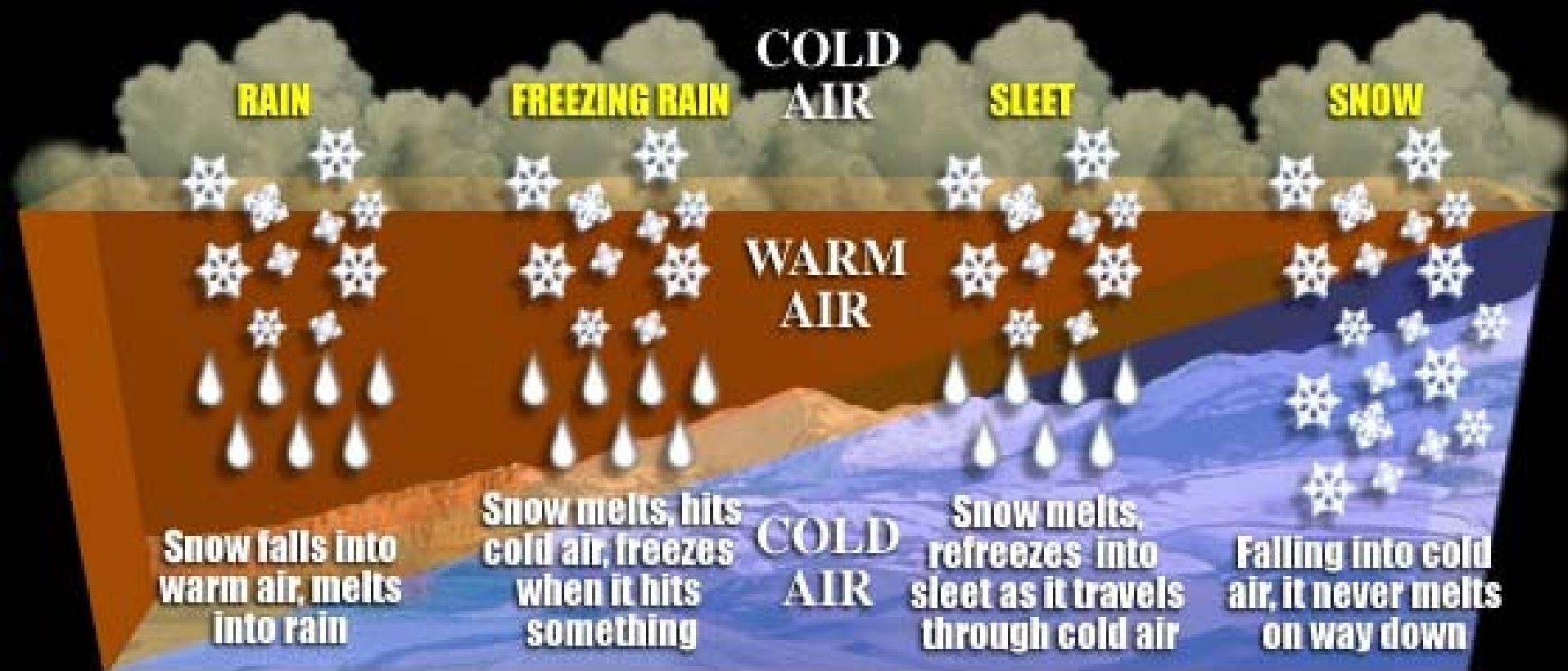
**COLD  
AIR**

Snow falls into  
warm air, melts  
into rain

Snow melts, hits  
cold air, freezes  
when it hits  
something

Snow melts,  
refreezes into  
sleet as it travels  
through cold air

Falling into cold  
air, it never melts  
on way down





***QUESTIONS ???***